

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

1. (Currently Amended) A plasma processing apparatus for effecting predetermined processing on a substrate by exposing the substrate to a plasma production region, comprising:

a chamber in which the substrate is introduced;

a top plate portion arranged above said substrate introduced in said chamber, and forming a part of a wall of said chamber; and

an antenna portion supplying a high-frequency electromagnetic field into said chamber to form the plasma production region in a region between said top plate portion and said substrate located in said chamber, wherein

said top plate portion and said antenna portion are arranged with a space therebetween.

said antenna portion includes a radial waveguide having a predetermined inner diameter,

said chamber has a predetermined inner diameter in a portion containing said top plate portion and said antenna portion, and

assuming that said radial waveguide has the inner diameter of A, the

portion containing said top plate portion and said antenna portion has the inner diameter of B, and the high-frequency electromagnetic field has a wave length of  $\lambda_g$  based on a composite dielectric constant resulting from a dielectric constant of said top plate portion and a dielectric constant of a space of the portion containing said top plate portion and said antenna portion, the following formula is satisfied:

$$(B - A)/2 = (\lambda_g/2) \cdot N$$

where N is zero or a natural number.

2. (Previously Presented) The plasma processing apparatus according to claim 1, wherein

a portion of said chamber opposed to a region for forming said plasma has a predetermined inner diameter, and

assuming that said region for forming the plasma has the inner diameter of C, the following formula is satisfied:

$$C \leq A$$

3. (Previously Presented) The plasma processing apparatus according to claim 2, wherein

said top plate portion includes a dielectric material.

4. (Previously Presented) The plasma processing apparatus according to claim 1, wherein  
said top plate portion includes a dielectric material.